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PROGRAMED INSTRUCTION AS A STRATEGY FOR DEVELOPING CURRICULA FOR CHILDREN FROM DISADVANTAGED BACKGROUNDS.

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DESCRIPTORS- *PROGRAMED INSTRUCTION, LANGUAGE INSTRUCTION, LANGUAGE SKILLS, *DISADVANTAGED YOUTH, *TEACHING METHODS, DEVELOPMENTAL PROGRAMS, OVERT RESPONSE, INDIVIDUAL DIFFERENCES, CLASSROOM TECHNIQUES, BEHAVIORAL OBJECTIVES, SMALL GROUP INSTRUCTION, *EDUCATIONAL GAMES, *CURRICULUM RESEARCH, CURRICULUM DEVELOPMENT, MATRIX GAMES, BEREITER AND ENGELMANN,

MATRIX GAMES IS A MODIFIED PROGRAMED-INSTRUCTION APPROACH TO TEACHING AND DEVELOPING LANGUAGE SKILLS. IN THIS STUDY, A BOARD DISPLAYING 16 PICTURES IN A 4 X 4 MATRIX WAS PLACED IN FRONT OF SEVERAL 4- OR 5-YEAR-OLDS. THE PICTURES COMPOSING A ROW CONTAINED A COMMON ITEM, FOR EXAMPLE, A BOY. THE PICTURES OF A COLUMN ALSO CONTAINED A COMMON ITEM, FOR EXAMPLE, DRINKING MILK. THE GAME BEGAN WHEN THE TEACHER COVERED 1 OF THE 16 PICTURES AND ASKED THE CHILDREN TO DESCRIBE THE CONTENTS OF THAT PICTURE. BY SCANNING BOTH THE ROW AND COLUMN OF WHICH THE COVERED PICTURE WAS A PART, THE CHILD COULD DETERMINE, BY ABSTRACTING OUT THE COMMON ITEMS OF THE PICTURES IN THAT ROW AND COLUMN, THAT THE COVERED PICTURE WAS, SAY, 2 BOYS WEARING A HAT. THIS PROCEDURE INDICATES THE CHILD'S COGNITIVE AND ARTICULATION ABILITIES SO THAT DIFFICULTIES IN THESE 2 AREAS CAN BE DISCOVERED AND CORRECTED. MATRIX GAMES INCLUDES WITHIN ITS INSTRUCTIONAL FRAMEWORK THE IMPORTANT PRINCIPLES OF TEXTBOOK AND MACHINE-TYPE PROGRAMING, NAMELY (1) CLEAR SPECIFICATION OF INSTRUCTIONAL OBJECTIVES, (2) CAREFUL SEQUENCING OF STEPS, (3) USE OF SMALL SEQUENCING STEPS, (4) SUBSTANTIAL ACTIVE PARTICIPATION BY THE STUDENT, AND (5) CONFIRMATION OF THE CORRECTNESS OF THE STUDENT'S RESPONSE. THE ADVANTAGE OF PROGRAMED-INSTRUCTION ORIENTED CURRICULA, LIKE MATRIX GAMES, IS THEIR FLEXIBILITY. THEY RESPOND TO INDIVIDUAL DIFFERENCES AND RATES OF LEARNING. (WD)

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# PROGRAMED INSTRUCTION AS A STRATEGY FOR DEVELOPING CURRICULA FOR CHILDREN FROM DISADVANTAGED BACKGROUNDS

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My primary objectives in this paper are to present an approach to language instruction for young children from disadvantaged backgrounds, and to explain how the curriculum makes use of the discipline of programed instruction. I will attempt to do this by describing a language and concept curriculum, Matrix Games (Gotkin, 1967), which, while not programed in the conventional sense, makes ample use of the discipline. Finally, I will examine briefly the relative contributions of research strategies for curriculum development. The reader should not be surprised to learn that the author finds programed instruction, his discipline, offers greater possibilities than other research approaches.

An underlying theme of this paper is that it is possible to have a programer's concern with sequence and structure in working with young children and end up with direct instruction curricula different from that of the academically-oriented preschool offered by the Illinois group (Bereiter & Engelmann, 1966).

# DESCRIPTION OF A PROGRAMED LANGUAGE AND CONCEPT CURRICULUM FOR FOUR AND FIVE YEAR OLDS: MATRIX GAMES

The language curriculum to be described was developed to improve the receptive and productive language skills of four and five year olds from disadvantaged backgrounds. Observing children playing the Matrix Games is a far more effective way of understanding what the games are about than reading the description presented below.

Ideally what you should see is five or six children sitting in small chairs in front of a board displaying 16 pictures (Illustration 1). Examination of the pictures in the illustration reveals certain regularities: in the first column, all of the children are holding cookies; in the second, all of the children are wearing gloves; in the third, all are drinking milk; and in the fourth, all are wearing hats. Scanning the pictures by rows reveals that each row has a common element: one boy, two boys, one girl, and two girls.

If the children had been playing the games for a few weeks, one of the children might be sitting in the adult chair while the other four and the teacher are sitting in children's chairs. The child playing the role of the teacher might be heard saying to "her" class, "Close your eyes, no peeking." Then she would get out of her chair and cover one of the pictures with an opaque magnetized rectangle. "Now open your eyes. Who can tell me something about the picture that I covered?" Whereupon several of the children

raise their hands, and the child-teacher calls upon one of them.

What is the content involved in figuring out the covered picture? What must the child be able to do in order to come up with the answer? To produce a complete answer, the child must be able to (1) scan the pictures vertically and horizontally, (2) abstract the common element of both the row and of the column of the hidden picture, (3) combine these two pieces of information, (4) produce the information in a sentence, and (5) explain in words how he figured it out. Underlying the solution to this type of matrix problem are classificatory skills, which Sigel (1966, 1967) finds are more difficult for children from lower-class backgrounds than for their middle-class peers, especially when the contents are presented by pictorial representation.

The Matrix Games curriculum has concerns other than the complex cognitive abilities involved in solving the above problem. Within the context of the children's play there are other objectives: to speak clearly; to follow complex directions; to develop new vocabulary and concepts and, most important, to be an independent learner. Being an independent learner can have many definitions. Within the context of the Matrix Games, being an independent learner refers to the ability to take the teacher's role. Taking the teacher's role encompasses a variety of skills and competencies including asking questions and monitoring one's own as well as other children's behavior. The importance of this objective as intrinsic to the way the games are designed will be discussed later in the paper.

The language content of the illustrative matrix involves sentences that are variations of "the boy is puttingoon his hat." The subject can be varied (girl, boys, girls, he, she, they). The nature of the pictures allows for variation of the verb form in content and tense ("is" or "was drinking milk"). That is, a single matrix presents many examples of a type of sentence pattern. Many linguists stress the importance of pattern drills in developing language fluency.

## MATRIX GAMES AND PROGRAMED INSTRUCTION

The Matrix Games curriculum has been developed in accordance with the discipline of programed instruction. Many of us involved in that field have been concerned over the public misconception that our discipline is synonymous with textbooks or machines that present opportunities only for cramped, one-word responses, and mechanical feedback of some kind. While the discipline of programed instruction can certainly be applied to such textbooks or machines, the discipline itself exists apart from a particular instructional medium. While the Matrix Games curriculum provides clear indications of the applications of programing principles, the games are conceived of more flexibly than most programed instructional sequences. This flexibility will be explained after the applications of the principles have been presented.

In their programing and research, programers pay strict attention to a number of principles:

(a) clear specification of instructional objectives

(b) careful sequencing

(c) small steps

(d) active participation by the individual, and

(e) feedback or confirmation of the correctness of a response (Gagne, 1965; Holland, 1965)

In order to illustrate more specifically how these principles were employed in designing the Matrix Games, a number of examples are given below.

(a) Clearly specified instructional objectives -- An example of such a statement of instructional objectives involves the problem presented above: given a matrix of pictures, the child will be able to figure out the content of a covered picture by abstracting the common vertical and horizontal element, state it so that the rest of the group can understand his answer, and explain how he arrived at the answer.

(b) Careful sequencing -- While the statement of instructional objectives defines what the learner will be able to do, careful sequencing specifies how it is to be done, i.e., the route or routes to reaching instructional objectives.

The Matrix Games are sequenced in three ways:

1) The twenty matrices are sequenced to increase in complexity. The pictures in the illustrative matrix can be classified quite readily on the basis of information that is visually available. On the other hand, later matrices involve conceptual classification by function such as: animals, where the animals live, what they eat,

and their special characteristics.

2) The requirements of the games played with each matrix increase in complexity. At the outset the games involve following simple directions such as "Put this circle on the two boys drinking milk." Later the game might involve directions like: "Put a red X on one girl putting on her hat," and "First, put a blue circle on.... and then put a green X on ...." The gradual sequencing involves not just matters of directions but the complexity of the cognitive requirements.

3) The children's verbal responses similarly increase in complexity. From indentifying the content of a picture with a label like "a fireman" the children describe their own actions for increasingly complex direction-following games, such as, "I put a red X on the boy walking the dog and a blue circle on the man riding the horse."

(c) Small steps -- The child is given the opportunity to respond after only a small segment of information has been presented. The sequence of steps leading to the final objectives is designed to be easy enough to insure that learning will occur with few, if any, errors. A beginning step might involve merely placing a symbol on a picture of a man walking a dog. The response here involves processing a minimum amount of information and placing a symbol on the board.

There is considerable confusion about the issue of step size.

At the outset the steps or units of learning are relatively simple. However, they summate and become more complex as the concepts themselves increase in complexity. This is clearly illustrated in the problem of figuring out the missing picture. The answer involves the simple statement of a sentence that has been stated at earlier levels under simpler conditions. However, to state that sentence when the picture is missing involves abstracting the common elements along two different dimensions and coordinating that solution into a single statement.

(d) Individual active participation -- The programer is committed to the importance of overt responses being made by the learners at each step in the learning sequence. The commitment to this principle stems in part from a distrust of group-learning curves which, as has been demonstrated, do not accurately describe individual acquistion (Sidman, 1960). This commitment is obviously compromised in part by the fact that the Matrix Games are recommended as a small group activity. However, each child does get many opportunities to respond and even when the child is not responding himself, he must pay attention because he may be the person called upon.

The overt responses of active participation are important in their contribution to learning. Moreover, they are valuable to the teacher in providing evidence of the child's grasp of the concepts. Each child's responses are themselves a record of his level of mastery, and can be used to move the child ahead or to provide

more practice.[1]

While some form of grouping is encouraged, the Matrix Games lend themselves very much to children's participation at different levels in the course of working with the same matrix. One child may merely be asked to describe the contents of pictures at early stages, while another may be figuring out the missing pictures. Slower children may be involved in the game checking the adequacy of the answers of those children who are getting the idea of figuring out missing pictures.

(e) Confirmation -- The programer provides the learner with confirmation as to the correctness of his response. In programed textbooks confirmation is provided so that the learner can compare his response to the correct one. The children are able to compare their responses to the correct one in the game that involves figuring out the missing picture. However, in most of the Matrix Games, confirmation is provided by the teacher.

The teacher is able to provide confirmation because the children's responses are overt. Procedures are provided in the teacher's manual so that, in principle, learners seldom need be told they are wrong or inadequate. This is illustrated by the handling of Johnny's incomplete answer:

Teacher: What did you do, Johnny?

Johnny: I put it on the man.

Teacher: There is a man in the picture! Johnny, what's the man doing?.....(If the child doesn't say, then, "Is he walking the dog or riding the horse?")

[1]Checklists are supplied for the teacher to keep track of the progress of each child.

Johnny: Riding the horse.

Teacher: That's right... the man is riding the horse... Let's all say that...the man is riding the horse.....What's this symbol?.....(Often the child will provide the answer. If not, then)... Is it an X or a circle?

Johnny: A circle.

Teacher: And what color is the circle?

Johnny: Blue.

Teacher: A blue circle, good. You put a blue circle on the man riding the horse. Johnny, tell me what you did.

Notice the procedures elicit the answers by providing prompts that are needed and without inferring error.

Procedures for partically correct answers emphasize to the child and his classmates the correct elements of his response before focusing on the error.

Teacher: I want someone to put a blue circle on the boy who is drinking milk.....Charles.

(Instead of a blue circle, Charles puts a blue X on the correct picture.)

Teacher: (Taking the blue X off the picture and pointing to the picture) Who is in the picture?

Charles: A boy drinking milk.

Teacher: That's right. The boy is drinking milk. And, what color is this?

Charles: Blue.

Teacher: Good. And, what do we call this?

Charles: An X.

Teacher: Right. And, what is this? (Holding up a circle.)

Charles: A circle.

By following these procedures the teacher has learned that Charles

does know all of the elements of the directions. Charles' error at this point in the sequence is most common. It would seem that the issue involves the amount of information in the directions, not its content. Notice the teacher has been able to find this out without having to tell the child he has been wrong.

It is important that the children learn to assess the adequacy of their own and others' responses. The teacher is encouraged to make various types of errors so that part of the "game" is to locate her mistakes.[2] Needless to say, catching and correcting the teacher's errors adds to the children's involvement in the games. It is delightful to observe how some of them correct her using the same kinds of procedures she has used with them.

Another type of confirmation involves lifting the opaque square to see if the picture underneath is their answer. This is especially interesting when there has been some disagreement as to the content of the picture. Later in this paper the importance of monitoring behavior will be discussed.

## FLEXIBILITY

Most programed sequences are designed to move in a single direction toward the stated behavioral objectives. Being a small group activity, the games compromise this orientation. Obviously, children will be at different levels of mastery even when some

[2]Two types of errors that the children enjoy the most involve absurdities like "Put this X on the horse riding the man" and "Put the red X on the man riding the elephant" when no elephant is present. Many of the children do have difficulty when these types of problems are posed.

form of either ability or performance grouping is practiced. Furthermore, because the objectives themselves expand in different directions, and the games are teacher directed, the teacher is free to select different objectives for different children or even groups. A teacher concerned with following directions might expand the complexity of the directions, another teacher might emphasize speech articulation, while another might place great emphasis on the contents. As a teacher directed program, the teachers are free to take the program in very different directions.

## EMPIRICAL TESTING

While programed instruction is concerned directly with the factors previously mentioned - clear specification of instructional objectives, careful sequencing, small steps, individual active participation, and confirmation of the correctness of a response - the most critical aspect of the discipline has not been discussed thus far, and that is its empiricism. The efficacy of the programer's instructional program must be subjected to empirical test. In testing, the programer usually works first with one subject at a time, paying close attention to the learner.

While all of the stages of testing - from developmental to validation - are important, only developmental testing will be discussed in this section. The kind of observation required in this process demands that the tester be alert both to the obvious difficulties of a child with the program and to the more subtle manifestations of his reaction to it. In addition, this observation requires interpretation of behavior as well as accurate recording

of observed responses. The process of observation and subsequent modifications in accordance with the learner's response continues until the learner is able to reach the desired goal.[3]

My orientation to developmental testing differs considerably from that of most of my colleagues. My approach has been influenced by working on non-automated curricula with pre-literate children from disadvantaged backgrounds. At the outset I obtain prototype materials, set limited objectives and work from a crude outline. I then play with one or two children at a time. Not having a firm commitment to sequence I am free to respond to the children and they are freer in their response.

Matrix Games began as two sets of rough drawings on cards. In a few hours I was able to determine that most children would be able to locate one among sixteen pictures, that those children who found sixteen pictures too many were most often able to cope with four, and that there were considerable motivational differences in picture contents. Basic sequences could be tested and revised and retested before the Matrix board was even designed.

Although less applicable to automated formats, such an approach saves time and money, eliminates blind alleys, and educates the programer quickly about the efficacy of his objectives for his target population.

[3]The most detailed description of the programer's commitment to the revision of the program based on observation of the learner's response has been given by Susan Markle (1967).

The Matrix Games curriculum is one of several that have been and are being developed in ways that make use of the discipline of programed instruction. Contents vary from calendar concepts (Gotkin, 1967) to puzzles involving visual discrimination skills, to taped materials involving the adventures of animal characters as well as taped dialogues in which children discuss their adventures in the community. One of the most interesting techniques we have begun working with makes use of pantomime (Shaw, 1967).

## CLASSROOM IMPLEMENTATION

Considerable confusion and enumerable problems in curriculum development and assessment stem from the failure to separate problems of instruction from problems of implementation. My first experiences in programed instruction involved field testing other programers' materials. In that position, I was responsible for taking into classroom situations materials that had been developed and tested by the programer with individual students (Gotkin and Goldstein, 1964). The results obtained by programers in testing one student at a time, or in classes which they taught themselves, were different from results of testing in classrooms in which the teachers were neither familiar with nor committed to the content. Observation of classroom use of a variety of experimental programs revealed that teachers varied greatly in their ability to manage programed instructional materials.

This variability had two primary sources: one, some teachers were unable to cope with the enormous individual differences which

became observable as children paced themselves through the programs, and two, some of the programed materials required a considerable amount of teaching and supervision to enable them to be manageable in a classroom setting.

While the manageability of materials is important with any group, it is particularly important with very young children, and especially for young children from disadvantaged backgrounds. Let me offer a seemingly trivial illustration. For several years, as part of our pre-reading program, we have been teaching children to make their own names before they can write. Each child has his own envelope which contains his name printed on a card and cardboard letters (at the outset only those in his first name). Once he has his own envelope he can practice making his name. The procedures for helping the child learn to make his name putting the letters in order without refering to the card is an instructional problem; the procedures for handling the envelope on an individual basis so the curriculum can work in a classroom setting is an implementation problem. If each time a child wants to practice making his name the teacher must herself sort through the set of envelopes to find the name of a particular child, it is less likely that the curriculum will be implemented. I have often asked participants in curriculum workshops how they would solve the problem. It is amusing, but also disturbing to discover how often teachers suggest the children's names be printed in large letters on the envelope. The teachers seem less than amused when we point out that this is precisely what the curriculum is about -- to read their own names. Our solution to

this problem has been to have each child draw a picture of himself on the envelope.[4] Now, without being able to read his name, he is able to locate his envelope. Incidentally, this procedure has another value because it brings closer to the child the relationship between the concept of himself and his name. The result of this seemingly simple procedure of having the child's picture on the envelope is that the teacher is free and the children can work independently. Furthermore, once the children have mastered the skills of working with their name cards, they can practice making any words for which the teacher makes envelopes and cards.

In regard the Matrix Games we had to face implementation problems with the board itself. The most difficult involved developing symbols that children could manipulate and would adhere through a cardboard thick enough not to curl away from the board. In regard the cardboards, the twenty picture matrices, we needed to work out a way of storing them so that they were readily accessible and quickly interchangeable. Most educators, and people generally, find these "trivial" problems uninteresting until they have to confront them. Too often their reaction is to judge the efficacy of the entire curriculum, which is a little like rejecting the idea of a toaster before the automatic pop-up was available.

[4]This solution was suggested by Mrs. Sandra Bangsgaard, a curriculum supervisor at the Institute for Developmental Studies.

## DISCUSSION

Thus far, I have described how programed instructional principles were implemented in curricula developed for young children from disadvantaged backgrounds and how such curricula raise problems of classroom implementation. This discussion section centers about the, overarching curriculum questions of what and how to teach. The decisions of "what" and "how" are controversial at every educational level but at no level more controversial than with young children from disadvantaged backgrounds.

Until recently, the primary emphasis of early childhood education has been the socialization of the child to the classroom. Reading readiness is espoused as an objective but is so generally defined as to defy assessment. Socialization is to take place largely through children's spontaneous play with a minimum of teacher intervention.

The notion that nursery and kindergartens are places to play is borne out by a conversation with a middle class nine-year-old with whom I had been playing a mental arithmetic game:

Child: "Are you a teacher?"
Me: "I am."
Child: "What do you teach?"
Me: "I'll be teaching nursery this fall."
Child: (Laughing) "You can't teach nursery."
Me: (Indignant) "What do you mean I can't teach nursery!" (I though he meant a man would not be permitted to teach nursery level.)
Child: "'Cause there's nothing to teach."
Me: "Nothing to teach? What do you mean?"
Child: "There's nothing to teach. All you do in nursery school is mess around."

While the early childhood people maintain that children learn

through their playing or "messing around," the general image of nursery school is that it is a place for the children to play, the teachers to observe and intervene in a limited way. In claiming how much children learn from play, early childhood educators have failed to make distinctions between providing an environment in which children play out and practice social and intellectual competencies, developed in the home and one in which the conditions function to develop <u>new</u> behavior. Those who doubt the importance of this distinction ought to monitor the language behavior and role relationships acted out in the doll corner in classrooms catering, on the one hand, to middle-class children and, on the other, to ghetto children.

The strongest attack on the early childhood approach has come from Bereiter and Engelmann (1966), who criticize early childhood notions of readiness as inappropriate for the requirements of school achievement. Conventional notions of Head Start enrichment are viewed as inadequate because the disadvantaged child can at most only receive a small portion of the rich experiences of an advantaged child, and thus needs activities still more productive of learning in order not to remain behind. Instead of the warm social climate of early childhood classrooms, Bereiter and Engelmann offer instruction with specific academic goals.

What should the content of nursery and kindergarten classes for children from disadvantaged backgrounds be? My discipline is a technology of instruction. As a technology, in and of itself, it does <u>not</u> define what ought to be taught. It is as an educator that

I establish objectives for materials I develop. As an educator and programer I read research which often claims to be relevant to the problems of educating children from disadvantaged backgrounds. While I do get ideas from some of the studies, it is a myth that research findings provide the basis for educational programing. That is not to say that such research should not be done nor that such research does not provide important ideas. Let me explain by examining two of the most common types of research relating to disadvantaged children.

A prevalent type of study involves collecting data by administering batteries of tests. The teats usually assess aspects of reading, language, general intelligence, etc. These tests are administered to samples that may differ in ethnic background, reading levels, etc. The results are analyzed statistically usually by analysis of variance and/or factor analysis. The results almost invariably show differences between social class groups.

The problems with such studies is that group differences are treated as group deficits which fail to point to the large proportions of lower class children who are thoroughly adequate as learners. More important, the results tell us little about why the differences exist and even less about what to do to eradicate them. I would go so far as to argue that using teat results for groups will lead as often to developing irrelevant remedial procedures as relevant ones. The findings are too gross to help either curriculum specialists or teachers.

The usual procedure for researchers who identify an area of "deficit" is to then apply for a grant to teach the children in that particular area. Such projects are rarely very successful. That is, while the researcher may be able to identify differences on tests he is unable to provide appropriate instruction, especially when that instruction must be provided in real classroom settings.

Far richer and more revealing are studies of socialization. The most quoted, and I believe appropriately so, analyst is Bernstein. Bernstein is concerned with language, as are many of those who administer batteries of tests. He contrasts status-oriented with person-oriented social systems. Lower class homes and social environments he finds to be status-oriented while middle class environments are more person-oriented. The language of status-oriented relationships, like the military, makes use of what he identifies as restricted codes. On the other hand, person-oriented systems help make use of and help develop elaborated language codes. In studying maternal styles Hess has corroborated Bernstein's findings and demonstrated that these codes influence the teaching style of the parents (Hess, 1965).

What is interesting is that persons holding divergent views find Bernstein relevant. Early childhood educators upon hearing Bernstein invariably argue that his theory and findings corroborate their approach in that they provide for the child's free expression. On the other hand, I have heard persons argue that Bernstein's work demonstrates why the Bereiter/Engelmann instructional system is appropriate when working with groups of ghetto reared children.

They argue that instruction should proceed from status-oriented relationships since the children accept, respect, and are more easily managed when authority is clear and free choice limited.

Earlier in this paper I described the objectives for the Matrix Games. These objectives include language and concept skills which are very similar to objectives selected by Bereiter and Engelmann. However; the objectives include other skills which involve the roles the children take in instructional settings.

The significance of these added objectives was illustrated in a testing of the Matrix Games along with the Bereiter/Engelmann approaches to language instruction at the Henry Horner Preschool in Chicago. Two assistant teachers each instructed two groups of six four year olds using the different methods. Each instructed two experimental groups using the Bereiter/Engelmann approach and two using the Matrix Games. The teachers were first trained in the Bereiter/Engelmann approach, and then in the use of the games.

After several months I received a tape of each teacher conducting a lesson using the Matrix Games. In listening to the tape, I found there was something quite different in the way I had intended the games be played. To corroborate my concerns, I visited another nursery class at the Institute for Developmental Studies where the Matrix Games were also being used. The contrast came through clearly. The styles of use heard on the tape and seen at the Institute were very different. In the Institute class, the children's voices were heard both giving and following instructions, and the teacher's role had become minimal. On the other hand, the teachers in the Henry Horner

setting were more active in running the game, giving instructions which the children followed. In both settings the children were involved and oriented to the task. There was a spirit of levity in the Institute class that was less obvious in the other setting. What was quite clear is that the procedures for controlling the groups differed. The use of the Matrix Games was influenced by the traíning and practice the teachers had in the Bereiter/Engelmann approach.

My intent in describing this incident is not to criticize the users of the games in the Henry Horner setting. It would be unrealistic to expect the persons instructing groups of young children alternatly in two methodologies involving similar content to compartmentalize the two completely. Furthermore, it is unlikely that the intermingling of the two approaches occurred only in one direction. I would like to suggest that the teachers' handling of some aspects of direction giving and following benefited from their experience with the Bereiter/Engelmann approach. This is especially evident in their facility to pick up the pace of the games when it seemed to lag. What I am pointing out is that while there is great similarity between the "what" of the Matrix Games content and the Bereiter/Engelmann approach to language instruction, there is considerable difference in the "how." These differences may be described in terms of different approaches to control and different approaches to the relationship between the teacher and the children. In my own orientation I have come to treat the "how" issue, the approach one uses in teaching, as part of "what," the content. This is obvious in the Matrix

Games. Intrinsic to the objectives of the Games, therefore, is the children's learning of active social roles in which they not only are controlled but control.[5]

In the remainder of this paper I would like to discuss three topics: 1) the special contribution of programed instruction to defining objectives; 2) the issue of reproducible results; 3) individual differences and education of children from disadvantaged backgrounds.

1) Special contributions of programed instruction:

While the discipline of programed instruction does not define what ought to be taught, it makes a special contribution to shaping objectives. The process of programing requires setting an objective, planning a sequence of steps and conditions which you think will enable the learner to reach that objective, testing this sequence with a limited number of students, and then repeating the process.

In the process of tutoring young learners I have too often learned that my initial analysis was inadequate. Such testing by tutoring enables the identification of missing skills that are often far more pervasive and relevant than the original objectives. That is, unidentified assumed entry behaviors are not present, and this leads to the redefinition of the objectives. Furthermore,

[5] A similar point served as the basis of John Dewey's Democracy and Education, in which he points out that it is important not only to teach about the aspects inherent in a democratic system, the "what" of democracy, but also to implement democratic procedures in the classroom which in themselves illustrate the "how" of democracy.

such testing reveals the relative difficulty of achieving certain objectives. Some things that students do not know or are unable to do can be taught very simply, others turn out to be extremely complex. These issues were documented in a recently completed training study involving visual discrimination (Gotkin, et.al.,1967). One of the experimental variables involved providing transparencies for the matching response so that the learners, five year olds, would have added visual information to judge whether or not their responses were correct. Most of the children did not make use of this information until the experimenter provided positive or negative feedback.[6] The orientation and ability to make use of different types of feedback can be viewed as a general content far more important than the specific skills being taught in this training experiment. A further outcome of the programer's orientation is that the process of tutoring toward objectives is very revealing of the characteristics of the child as a learner. This type of information is particularly important for the teacher whose job it is to encounter the child as a learner.

2) <u>The issue of reproducible results</u>:

Critical to the discipline of programed instruction and to the assessment of all educational innovations is the issue of "reproducible results." The programer has a firm commitment to establishing instructional sequences and principles which do achieve

[6] We had hypothesized that the visual information available in the transparencies would be used. In presenting this experiment to educators and psychologists, we have asked them to predict the results, and they also predicted this information would be used. It would seem that even experienced adults are not very good at predicting the details of learning performance.

similar results when used with comparable populations in other settings. The programer's commitment stems from the fact that his discipline sprung from the rigorous study of learning in laboratory settings (Skinner, 1954).

Examination of innovative educational programs, especially those dealing with young children, indicates that none have translated into other settings with anywhere near the spectacular results obtained under the guidance of the innovator. Any innovator concerned with the dissemination of his ideas must deal seriously with problems of implementation which requires the innovator to define the conditions necessary to achieve similar results in situations not directly controlled by him.

3) Individual differences and the education of children from disadvantaged backgrounds:

After observing teachers present lessons to entire classes of kindergarten children, I would like to stretch a point and suggest that large group instruction tends to reach the non-existent mean, that balance half-way between those who already know and those who do not yet know. Answers are supplied by children who already know, while those who do not know rarely benefit from hearing the answer. Teachers proceed as if some learning has taken place.

The obvious implications of this observation is that instruction need be individualized. One of the basic commitments of programed instruction is that children be free to proceed at their own rates. Systems that provide for individualization are especially important in ghetto schools. Classrooms have larger

numbers of students who are absent, late and transfer into classes. Teachers are too often unable to teach at all trying to cope with management problems created by unstable student bodies. Only if the teacher can individualize is she able to provide for these children and keep the other children moving at their appropriate paces - which leads to a final point.

When objectives are clearly defined and appropriate instructional sequences are provided to facilitate and encourage children to accelerate, large proportions of ghetto children not only reach grade level expectancies but exceed it. The clearest documentation of this point is in the work of Bereiter and Engelmann (1967). In a very different way this issue was demonstrated in seven nursery classes with a sequenced set of picture-language games. Many early childhood educators and many of the teachers involved had argued that the children were not ready for dealing with the concepts using representations. Assistant teachers played the games at least three times a week in small groups. Before December each assistant teacher (and head teacher) reported that more than one third of her children had fully mastered the first three boxes of the games and requested the remainder of the games for those students.

In regard to those who argue that ghetto children are not ready, the programer's orientation is sensible because it tests the dimensions of the lack of readiness assertion. What becomes obvious in challenging that assertion is that large proportions reveal themselves to be rapid learners and that the curriculum has failed to permit them to demonstrate how capable they are of learning.

| | EATING COOKIES | WEARING GLOVES | DRINKING MILK | WEARING A HAT |
|---|---|---|---|---|
| BOY | | | | |
| TWO BOYS | | | | |
| GIRL | | | | |
| TWO GIRLS | | | | |

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